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**REPORT ON THE HYDROIDS COLLECTED ON THE COAST OF ALASKA AND THE ALEUTIAN ISLANDS, BY W. H. DALL, U. S. COAST SURVEY, AND PARTY, FROM 1871 TO 1874 INCLUSIVE.**

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The Hydroids collected on the Alaskan coast by Mr. Dall, represent the fauna more or less completely from the Sea Horse Islands southwest of Point Barrow in latitude about  $71^{\circ}$  north, to Kyska Harbor  $52^{\circ}$  north, and from St. Paul Island, Pribiloff group, longitude  $170^{\circ}$  west, and Kyska Harbor  $182^{\circ}$  west to Sitka in longitude  $135^{\circ}$  west. This region includes a coast line of about 4000 miles naturally divided into three great divisions. The Arctic region, extending from Point Barrow to Cape Prince of Wales, washed by the Arctic Ocean; the western region, including all of the western coast of Alaska from Cape Prince of Wales to the Aleutian Islands, borders on Bering Sea, and the southern region, extending from the Aleutian Islands to Sitka, washed by the North Pacific. As the northern region is only represented by two species, one from the Sea Horse Islands and Cape Prince of Wales, and one from Icy Cape, we have no opportunity of comparing the Hydroid-fauna of that region with those of the other two. The region most abundantly represented in the collection is the southern, and it is here also that we find the most strongly marked fauna; for of the forty-two species in the collection, twenty-four are from the southern coast east of the Shumagin Islands, and of these twenty-four, fourteen are peculiar to this southern region. From the shores of the Aleutian Islands, from Unimak to Kyska, there are fifteen species represented, six of which are not found elsewhere, and four are found both to the northward in Bering Sea, and to the eastward in the Northern Pacific. The collections from these two regions (the Aleutian Islands, and the southern Alaskan coast, from the Shumagin Islands east to Sitka) contain thirty species, or fully three-fourths of the known species from Alaska. While this result is in part due to the fact that the greater amount of collecting has been done in these regions, it also indicates a richer fauna, for some important genera of the southern fauna are not represented north of the Aleutian Islands.

The most strongly marked barrier on the coast, as indicated by

the hydroids, is the Shumagin Islands on the southern shore, which is apparently the dividing line between the northern and southern forms. As in all the divisions of nature, there is, of course, no sharp line of demarcation, but a number of the species of each group have a range extending into the region of the other.

Of the forty-two species represented, sixteen have been recorded from the English coast, and of this latter number, all but two are found on the shores of New England; of the remaining twenty-six, one is identical with a New England form and the rest are new. The great majority belong to the group *Thecaphora* of Hincks, there being but four representatives of the *Athecata*.

The following table contains a list of all the Hydroids in the collection, and gives their range upon the Alaskan coast:—

## THECAPHORA.

<i>Obelia longissima</i> Hincks (Pallas).	Iliuliuk Harbor, Unalashka.
<i>Clytia Johnstoni</i> Hincks (Alder).	Lituya Bay to Popoff Straits.
<i>Campanularia denticulata</i> , sp. nov.	Port Etches.
“ <i>circula</i> , sp. nov.	Port Etches.
“ <i>turgida</i> , sp. nov.	Port Etches.
“ <i>compressa</i> , sp. nov.	Shumagin Islands.
“ <i>speciosus</i> , sp. nov.	Shumagin Islands.
“ <i>urceolata</i> , sp. nov.	Lituya Bay.
“ <i>integra</i> Macgillivray.	Lituya Bay to Semidi Islands.
<i>Gonothyrea hyalina</i> Hincks.	Semidi Islands to Nunivak Island.
<i>Lafoëa pocillum</i> ? Hincks.	Nunivak Island.
“ <i>gracillima</i> Sars.	Sitka Harbor to Shumagin Islands.
“ <i>dumosa</i> Sars.	Port Etches.
“ <i>fruticosa</i> Sars.	Shumagin Islands to Kyska Island.
<i>Calycella syringa</i> Hincks (Linn.).	Shumagin Islands.
<i>Coppinia arcta</i> Hincks (Dalyell).	Shumagin Islands.
<i>Halecium muricatum</i> Johnst.	Unalashka.
“ ? <i>plumularioides</i> , sp. nov.	Nunivak Island.
“ <i>scutum</i> , sp. nov.	Semidi Islands to Unalashka.
<i>Diphasia mirabilis</i> Verrill.	Port Möller to Shumagin Islands.
<i>Sertularia filicula</i> E. and S.	Shumagin Islands to St. Paul Island.
“ <i>similis</i> , sp. nov.	Hagmeister Island.
“ <i>cupressoides</i> , sp. nov.	Shumagin Islands to Hagmeister Id.
“ <i>variabilis</i> , sp. nov.	San Miguel Id., Cal., to Nunivak Id.
“ <i>inconstans</i> , sp. nov.	Unalashka.
“ <i>thuiarioides</i> , sp. nov.	Chignik Bay to Nunivak Island.
<i>Sertularella tricuspidata</i> Hincks.	Port Etches to Kyska Harbor.
“ <i>rugosa</i> Gray (Linn.).	Shumagin Islands to Nunivak Island.
“ <i>polyzonias</i> Gray.	Port Etches to Nunivak Island.

<i>Sertularella robusta</i> , sp. nov.	Shumagin Islands.
“ <i>pinnata</i> , sp. nov.	Lituya Bay to Unalashka.
<i>Thuiaria cylindrica</i> , sp. nov.	Port Möller to Hagmeister Island.
“ <i>robusta</i> , sp. nov.	Hagmeister Island to Seahorse Ids.
“ <i>plumosa</i> , sp. nov.	Nunivak Id. to Icy Cape, Arctic Sea.
“ <i>turgida</i> , sp. nov.	Lituya Bay to Kyska Island and Hagmeister Island.
“ <i>gigantea</i> , sp. nov.	Kyska Island to Hagmeister Island.
<i>Macrorhynchia Dallii</i> , sp. nov.	Akutan Pass.

## ATHECATA.

<i>Rhizonema carnea</i> , sp. nov.	St. Michael's, Norton Sound.
<i>Tubularia indivisa</i> (Linn.).	St. Michael's.
<i>Tubularia borealis</i> , sp. nov.	Hagmeister Island.
<i>Eudendrium pygmæum</i> , sp. nov.	Akutan Pass.

It is interesting to note that of the ten species of *Campanulariidae* represented, one only occurs to the northward of the Aleutian Islands; and as this one, viz. *Gonothyrea hyalina*, is recorded by Hincks from the Shetland Islands, by Sars from Lofoten, and by Professor Verrill from Eastport and St. George's Bank, it is apparently a northern or cold-water form. Both the species from the Arctic Sea belong to the genus *Thuiaria*, and of the five species of this genus in the collection, but one of them occurs south of Bering Sea. The genus is essentially a northern cold-water one. Hincks says of *T. thuiaria*, "it is a prevalent northern form, ranging to the North Cape," and Allman describes some species from very deep water, that were taken on the Porcupine expedition. The thickness of the perisarc seems to protect them from the dangers incident to living in cold deep waters.

A very noticeable feature, and a very general one, is the remarkable stoutness and large size of the specimens, especially in the *Sertulariidae*.

The main points of interest then derived from the study of this collection are—the strong indication of a faunal limit at the Shumagin Islands; the Hydroid-fauna to the south of that point being chiefly characterized by the large number of *Campanulariidae*, while the fauna to the northward is almost entirely destitute of that family and contains a larger number of *Thuiariæ*; the luxuriant growth and the robustness of nearly every species; the specimens of those species that are also found upon the New England shores being of larger size and stouter form than the eastern

specimens; thirdly, that while the fauna is quite distinct, as is indicated by the twenty-three new species, it has yet some similarities with the New England and British faunæ, which are shown in the fifteen species that are common to those three regions; fourthly, the small number of Athecata, which may be partly accounted for by the possibility of their having been overlooked, owing to the small size and obscure places of growth common to so many of the species of this group. And, lastly, the small number of species that are common to the Alaskan coast and the western shores of the United States from Vancouver Island southward. Of the twenty-three species recorded from the latter region one only, *Lafoëa dumosa*, is known from the coast of Alaska.

#### DESCRIPTIONS OF THE SPECIES.

##### THECAPHORA.

*Obelia longissima*, Hincks (Pallas).

This species is the most abundant member of the family in the collection, but, although some of the specimens are 150 mm. in length, and have a very luxuriant growth, a diligent search has failed to reveal any gonangia. It is possible that these forms may prove to be different from *O. longissima*, but the trophosomes agree so closely in every particular, that I think it quite safe to credit them to this species.

*Hab.* Iliuliuk, Unalashka; 3 fathoms, shingly bottom. Unalashka; 6 fathoms, November 11th, among sticks and beach-refuse, washed along the bottom. Unalashka; 80 fathoms, sand, and shells. Unalashka; 9 to 15 fathoms, September 10th. Unalashka; 15 fathoms, gray sand.

*Clytia Johnstoni* ? Hincks (Alder). Plate ix., fig. 12.

The collection contains specimens of a creeping campanularian from three localities which I have decided to call *C. Johnstoni*, for the present, at least. The gonangia are not present upon any of the specimens, and when known will enable us to decide whether these trophosomes have been placed in the right genus. The specimens from Lituya Bay correspond very closely with the New England forms of this species, while those from the other localities are more deeply campanulate, and some of them are much less tapering; the pedicels vary greatly in length and in the amount

of annulation which they bear. The character of the denticulation varies but little, if any, and the hydrothecæ, which show the greatest variation in size and shape, are connected by intermediate forms.

*Hab.* Lituya Bay; 9 fathoms, sandy-mud. Port Etches; 5 to 8 fathoms, gravel and stones, May 30th. Shumagin Islands, Popoff Straits; 6 fathoms, rocky, July.

*Campanularia denticulata*, sp. nov. Plate vii., fig. 4.

*Trophosome.* Hydrocaulus simple, creeping, giving origin to the pedicels at irregular intervals; pedicels of very variable length, from five to ten annulations at the base, and from three to eight at the base of the hydrothecæ, usually bearing but one hydrotheca, occasionally branched and bearing two. Hydrothecæ deeply campanulate, tapering from the distal end, quite slender near the base, rim ornamented with about fifteen large, acutely-pointed teeth. *Gonosome.* Gonangia unknown.

*Hab.* Port Etches, Alaska; 10 to 18 fathoms, clayey mud.

*Campanularia circula*, sp. nov. Plate vii., fig. 3.

*Trophosome.* Hydrocaulus erect, compound, composed of a number of slender united tubes, unbranched. Hydrothecæ large, deeply campanulate, rounded at the base, rim ornamented with from ten to twelve large denticulations, some of which are square-cut, others have slightly rounded edges, and are very shallow; the pedicels supporting the hydrothecæ are long and slender, a single distinct annulation at the base of the hydrothecæ, the remainder of the pedicel more or less twisted, arranged in verticils of four to six pedicels, at regular intervals on the stem. *Gonosome.* Gonangia unknown.

*Hab.* Port Etches, Alaska; 12 to 18 fathoms, clayey mud.

This well-marked form is represented by a single small specimen, which, unfortunately, is destitute of gonangia. Its nearest ally is *C. verticillata*, Lamk, from which it may be distinguished by the size and form of the hydrothecæ, and by the ornamentation of the rim.

*Campanularia turgida*, sp. nov. Plate viii., fig. 8.

*Trophosome.* Hydrocaulus simple, creeping, giving rise, at short intervals, to long pedicels bearing the hydrothecæ. Hydrothecæ large, turgid, rounded at the base, the rim ornamented with from twelve to sixteen roundly pointed or sometimes square-

topped teeth, borne on long, slender pedicels with a wavy outline, or occasionally a slight twist in them, a single well-marked annulation at the base of each hydrotheca, and from three to six annulations at the base of each pedicel. *Gonosome*. Gonangia borne on short pedicels consisting of five or six annulations springing from the creeping stem, flask-shaped, largest in the middle, tapering but slightly to the rounded base, produced into a neck distally, aperture terminal, discoidal.

*Hab.* Port Etches, Alaska; 12 to 18 fathoms, mud.

***Campanulari compressa***, sp. nov. Plate viii., figs. 5, 6.

*Trophosome*. Hydrocaulus creeping, simple, giving origin to the pedicels at irregular intervals. Hydrothecæ large, deeply campanulate, tapering to the base, the walls very thick, especially at the base, where they project inwards, forming a sort of diaphragm, upon which the polyp rests, rim entire; pedicels of medium length, with a single well-marked annulation at the base of the hydrothecæ, and usually two or three constrictions just beneath the annulation, not annulated at the base. *Gonosome*. Gonangia turgid, sessile, or with a very short pedicel, largest at the distal end, rounded at the base, very much compressed laterally.

*Hab.* Yukon Harbor, Shumagin Islands; 6 to 20 fathoms, sand and rocks, July 7th. Growing on a piece of *Laminaria*.

This form belongs in the same group with *C. calyculata*, Hincks, from which it may be distinguished by the gonangia, and by the base of the hydrothecæ.

***Campanularia speciosa***, sp. nov. Plate ix., fig. 11.

*Trophosome*. Hydrocaulus simple, creeping, twisted, bearing the pedicels at irregular intervals; pedicels short, more or less annulated, bearing each a single hydrotheca. Hydrothecæ very large, deeply campanulate, urceolate, the rim ornamented with about ten shallow teeth, and with an internal ridge extending from each tooth for about one-fourth the distance, to the base of the hydrotheca. *Gonosome*. Gonangia unknown.

*Hab.* Yukon Harbor, Big Koniushi, Shumagin Islands; 6 to 20 fathoms, gravel, July 7th.

This is the largest creeping Campanularian known, and is as noticeable for its beauty as for its size. The intrathecal ridges and the character of the denticulations make it a well-marked

form, readily distinguishable, without the gonangia, from any known species on the American coast.

**Campanularia urceolata**, sp. nov. Plate viii., fig. 7.

*Trophosome*. Hydrocaulus simple, creeping, rather stout, with a wavy outline, giving origin to the pedicels at irregular intervals; pedicels short, never more than twice the length of the hydrothecæ, usually annulated or twisted throughout, and always one annulation at the base of each hydrotheca more distinctly marked than the rest. Hydrothecæ large, deep, urceolate, rounded or slightly tapering at the base, with an internal support in the base of the hydrotheca upon which the polyp rests, rim ornamented with from thirteen to eighteen large rounded teeth. *Gonosome*. Gonangia small, fusiform, occasionally a trifle obovate, orifice small, terminal, discoidal, supported on very short pedicels consisting of but two or three annulations.

*Hab.* Lituya Bay, Alaska; 9 fathoms, sandy mud.

**Campanularia integra**, Macgillivray. Plate ix., figs. 9, 10.

This species is represented by two fine specimens, which are in an excellent state of preservation, and have three or four fully developed gonangia. The latter are a little larger than usual.

*Hab.* Semidi Islands; 15 to 25 fathoms, gravel, June 10th. Lituya Bay; 9 fathoms, sandy mud.

The specimen from the Semidi Islands was growing upon a stem of *Sertularella tricuspidata*.

**Gonothyrea hyalina**, Hincks. Plate vii., figs. 1, 2.

This is apparently one of the most common species of the family *Campanulariidae* on the Alaskan coast. Very good specimens were obtained from five different localities; those from the Semidi Islands being of especial value, as they bear extra-capsular medusoids at the distal ends of the gonangia. The medusoids vary in number from two to six, are slender and pyriform, which is probably, in part, owing to the contraction due to the alcohol.

*Hab.* Semidi Islands, Alaska; 15 to 25 fathoms, gravel, June 10th. Port Möller, Aliaska Peninsula; 13 fathoms, gravel; 17 fathoms, sand; August. Five miles southwest of the west cape of Nunivak Island; 30 fathoms, sand.

**Lafoëa pocillum**? Hincks. Plate xi., fig. 21.

There are two specimens of creeping forms of *Lafoëa* in the collection, to the examination of which I have given considerable



time. Number 1 has short, stout hydrothecæ of variable shape, borne upon short pedicels of from three to six annulations, the latter showing a good deal of difference in the stoutness, some being half as wide as the hydrothecæ, others not more than a third; most of the hydrothecæ are urceolate, like Hincks's figures of *L. pocillum*; others are regularly cylindrical, like Hincks's figure of *L. parvula*, and between these two are forms which make a connecting series between the urceolate and cylindrical types. Number 2 has the hydrothecæ of about the same width, but longer, the pedicels average a little longer, and it agrees more closely with *L. pocillum* than the more variable form of number 1. The perisarc of both these forms is very thick, and dark-brown colored.

*Hab.* Number 1 is from Cape Etolin, Nunivak Island, Alaska; 8 to 10 fathoms, stony. Number 2 is from Bering Sea, 5 miles west of west cape of Nunivak; 30 fathoms, sand.

*Lafoëa gracillima*, Sars. Plate xii., fig. 24.

Very fine specimens of this delicate form were collected, which show no variations from the specimens found on the eastern shores of North America. *Gonangia* unknown.

*Hab.* Coal Harbor, Shumagin Islands, beach; July 15th. Sitka Harbor; gravel and mud, 15 fathoms, May 1st.

*Lafoëa dumosa*, Sars. Plate xii., fig. 23.

This widely distributed species is also a member of the Alaskan Hydroid Fauna. The specimens are larger and more robust than those from the eastern shores of North America, and the hydrothecæ are more deeply merged in the stem. It is very singular that we are still obliged to record, for this common and widely distributed species, *gonangia* unknown.

*Hab.* Port Etches; 12 to 18 fathoms, clayey mud.

*Lafoëa fruticosa*, Sars. Plate xii., fig. 22.

This appears to be the most common of the four species of this genus in the collection. It differs only from the New England specimens in being more robust. *Gonangia* unknown.

*Hab.* Kyska Harbor; 10 fathoms, rocky, July 15th. Popoff Straits, Shumagin Islands; near edge of reef, 6 fathoms. Yukon Harbor, Big Koniushi, Shumagin Islands; 6 to 20 fathoms, sand and rocks, July 7th.

**Calycella syringa**, Hincks (Linn.). Plate xii., fig. 25.

A very fine specimen of this species occurs on a colony of *Lafoëa gracillima*. It is in very fine condition, and has the gonangia with extracapsular pouches in considerable abundance.

*Hab.* Coal Harbor, Shumagin Islands; beach, July, about the 15th.

**Coppinia areta**, Hincks (Dalyell).

A very fine specimen of this peculiar form was collected at the Shumagin Islands. The hydrothecæ are very long, and most of them curved near the distal end. Growing on the stem of a colony of *Lafoëa gracillima*. The largest hydrothecæ are 2 mm. long.

*Hab.* Coal Harbor, Shumagin Islands; beach, July 15th.

**Halecium muricatum**, Johnston (E. and S.). Plate x., fig. 15.

A single specimen of this species with the characteristic gonangia, was collected on Unalashka beach. The trophosome is about 50 mm. in height, but is in very poor condition, none of the hydrothecæ being present. The gonangia, however, are very abundant, are irregularly arranged on the basal half of the compound stem, and are in a good state of preservation.

**Halecium** (?) *plumularioides*, sp. nov. Plate x., figs. 16, 17.

*Trophosome.* Hydrocaulus erect, simple, straight, divided by transverse joints into internodes of considerable length, regularly branched, and with a few annulations at the base; branches arranged alternately on opposite sides of the stem, one to each internode, having their origin in a small shoulder-like process just below each joint, divided usually into regular internodes, though, in some cases, short internodes occur between the longer ones. Hydrothecæ arranged uniserially, usually one to each internode, partly adherent to the stem, or entirely free, shallow, tapering slightly to the base, with an entire rim.

*Gonosome.* Gonangia unknown.

*Hab.* Cape Etolin, Nunivak Island; 8 to 10 fathoms.

Height of largest specimen 20 mm.

I refer this species to the genus *Halecium* provisionally, for, the gonangia being absent, and the hydrothecæ having a different arrangement from any known *Halecium*, make it quite doubtful whether it belongs in this genus. It is the most delicate species in the collection. It closely resembles, in many particulars, the

*Plumulariæ*, from which it is separated on account of the absence of nematophores.

***Halecium scutum***, sp. nov. Plate x., figs. 13, 14.

*Trophosome*. Hydrocaulus erect, compound, exceedingly stout, rough, with an irregular outline, attached by a thick mass of interlaced stolons, much and irregularly branched; branches of two kinds, the larger ones stout, black, and like the main stem undivided by joints, the smaller are light horn-color, sub-erect, short, divided into long internodes, each giving origin to a single branchlet; branchlets divided by oblique joints into short, stout, wedge-shaped internodes, each of which bears at least one hydrotheca, often two. Hydrothecæ tubular, margin everted, arranged alternately, and occasionally a second one is borne in the axil of the first. *Gonosome*. Gonangia very large, obovate, with the orifice on one side; the latter varies much in position, occurring anywhere from the middle to near the distal end; it has an irregular outline, and is made very ornamental by the thickening of the perisarc around it; there is a thickened border around the upper edge, and below the orifice is a shield-shaped thickening in which are two ellipsoidal markings, where the chitin is only of the usual thickness.

Height of largest specimen 150 mm.

*Hab*. Unalashka; beach, low water, after gale, September. Coal Harbor, Shumagin Islands; low water, April; Gonangia abundant. Coal Harbor, Shumagin Islands; Gonangia abundant. Unalashka; beach, May 1st; Gonangia abundant. Semidi Islands, Alaska; 15 to 25 fathoms, gravel, June 10; Gonangia. Sanborn Harbor, Shumagin Islands; Gonangia abundant.

The specimen from which the above description is taken is a remarkably stout, coarse form, more closely resembling Hinck's figure of *Eudendrium rameum*, Pallas (*vide* frontispiece to Hinck's *British Hydroid Zoöphytes*, vol. i.), than any hydroid that I am acquainted with. The diameter of the mass of stolons at the base is from 15 mm. to 25 mm. The largest stem is 6 mm. thick at the base, and tapers very gradually to the distal end.

The variation which this species shows in the mode of growth is so remarkable that I will mention some of the most divergent forms. The specimens from Sanborn Harbor, Shumagin Islands, consist of tufts of light horn-colored stems about 50 mm. in height, rather slender and compound only for a very short dis-

tance at the base, branches very short. Gonangia present, and exactly like those of the typical form. Another style is from 20 mm. to 60 mm. high, from dark horn-color to black, stem stout, coarse, branches numerous and short. Gonangia very abundant; has a crowded look; specimens of this form are from Unalashka; beach. Semidi Islands; 15 to 25 fathoms, gravel. Coal Harbor, Shumagin Islands; beach, low water, after a gale in September.

*Diphasia mirabilis*, Verrill. Plate xiii., fig. 36.

American Journal of Science, iii., vol. v. p. 9, December, 1872.

Connecticut Academy of Arts and Sciences, vol. iii., Part I., p. 53.

Two specimens of this remarkable form are the only representatives of this genus in the collection. The specimens are in very good condition, and show no variation from Professor Verrill's type specimen from Le Have Bank, with which I have compared them. Gonangia unknown.

*Hab.* Hagmeister Island, Bering Sea; beach. Popoff Straits, Shumagin Islands.

*Sertularia flicula*, E. and S. Plate xii., fig. 30.

This species grows very luxuriantly, and is apparently quite common on the beaches. There is a good supply of it in the collection, mostly from Unalashka beach. It grows there in very dense masses from 50 to 80 mm. in height, is usually of a dark horn-color, and attached to algæ or sponge. The gonangia vary somewhat from the figure given by Hincks, but not enough to warrant a separation of this form from the British. The Alaskan form has the gonangia sessile, largest at the distal end, tapering to the base, aperture terminal, small, discoidal. In the British form they are more fusiform or are pear-shaped, largest near the middle, with a short tubular aperture. The trophosomes agree perfectly.

*Hab.* Unalashka; beach after gale, September. Coal Harbor; Popoff Straits, Shumagin Islands. St. Paul Island (Pribiloff group); 9 fathoms, sand, July 24. Hagmeister Island; beach. San Miguel Island, California. Nunivak Island; 8 to 10 fathoms. Constantine Harbor, Amchitka Island; 6 to 10 fathoms, sand and stones, July 20. Chirikoff Island; beach.

*Sertularia similis*, sp. nov. Plate xv., fig. 56.

*Trophosome.* Hydrocaulus erect, simple, slender, straight, jointed, pinnately branched, internodes of equal length and bear-

ing three hydrothecæ and a branch; branches short, slender, divided by transverse joints into short internodes, bearing two, sometimes three pairs of hydrothecæ, occasionally bearing one or two branchlets, constricted at the base; branchlets jointed like the branches, and like them constricted at the base, diverging at a wide angle from the branches. Hydrothecæ opposite, tubular, curved strongly outwards with a bilabiate orifice, the broad side being turned towards the stem; on the main stem there are three on each internode, a pair placed opposite to each other, and one in the axil of the branch; on the branches and branchlets they are arranged oppositely. *Gonosome*. Gonangia unknown.

Height of largest specimen, 85 mm.

*Hab.* Hagmeister Island; 8 to 15 fathoms, gravel.

This is a very interesting species, as it combines some of the characters of three other species of the genus. In mode of growth it approaches *S. cupressina*, in the shape of the hydrothecæ it is similar to *S. argentea*, and in the arrangement of the latter it is like *S. pumila*. Considerable variation is shown in the extent to which the hydrothecæ curve outwards; upon some of the branches the mouth opens at right angles to the stem, while upon others they open upwards.

*Sertularia cupressoides*, sp. nov. Plate xiii., fig. 37.

*Trophosome*. Hydrocaulus simple, erect, slender, two or three annulations at the base, divided by oblique joints into internodes of variable length, pinnately branched; branches arranged alternately, an even number to an internode, attached to the stem by quite a prominent process, annulated and slender at the base, the broader side facing the stem; the basal portion is sharply curved outward, the distal portion is nearly straight, and lies about at right angles with the stem, bearing but very few branchlets; branchlets short and diverging at a wide angle from the branches. Hydrothecæ tubular, deeply immersed in the stem, curving slightly outwards; orifice bilabiate, with the broader side facing the stem, arranged snb-alternately upon the branches and branchlets, none upon the main stem. *Gonosome*. Gonangia unknown.

Height of finest specimen, 80 mm.

*Hab.* Shumagin Islands, Popoff Straits; 6 fathoms, rocky bottom, July. Port Möller, Aliaska Peninsula; 13 fathoms, sand, August.

This species is quite similar to *S. cupressina* in some respects, but may be distinguished by the entire absence of hydrothecæ upon the main stem, and by having an even number of branches to an internode; the branches are also usually stouter.

*Sertularia variabilis*, sp. nov. Plate xiv., figs. 40 to 48. Plate xv., figs. 49, 50.

*Trophosome*. Hydrocaulus erect, simple, stout, flexuous, divided by transverse joints into short internodes, usually bearing a pair of hydrothecæ, those giving origin to a branch bearing one hydrotheca on one side and two hydrothecæ and the branch on the other, regularly branched; branches arranged alternately on opposite sides of the stem, short, stout, suberect, occasionally bearing a few short branchlets; the latter usually divided into regular internodes, bearing each a pair of hydrothecæ, sometimes occurring undivided. Hydrothecæ large, subalternate, the widest portion, the lower two-thirds, is immersed in the stem, the upper portion is narrower and curved strongly outwards and upwards; aperture large, discoidal, rim entire. *Gonosome*. Gonangia of two forms; No. 1 is pyriform, tapering rapidly to the base, sessile; orifice large, terminal, discoidal, ornamented with a number of chitinous teeth which project downwards into the gonangia; No. 2 is obovate, sessile, aperture terminal, large, provided with an internal collar, the latter ornamented with a number of acute teeth, which project downwards; borne in two rows on the upper sides of the branches.

Height of largest specimen, 100 mm.

*Hab*. Unalashka; beach. Lituya Bay; 112 fathoms. Hagmeister Island, Bering Sea. Sanborn Harbor, Shumagin Islands; beach. Captain's Harbor, Unalashka; 60 to 80 fathoms, sand, September 13. Port Etches, Alaska; 12 to 18 fathoms, clayey-mud. Five miles southwest of the west cape of Nunivak, Bering Sea; 30 fathoms sand. Popoff Straits. Semidi Islands; 15 to 28 fathoms, gravel, June 10. Unalashka; 6 fathoms, Nov. 11th. St. Paul Island, Pribiloff group; 9 fathoms, sand, Kelp ground, July 24th. Akutan Pass, near Unalashka; beach. Big Koniushi, Shumagin Islands; 6 to 20 fathoms, sand and rocks in Yukon Harbor, July 7th. San Miguel Island, California; W. H. Dall.

This is the most variable form of hydroid that I am acquainted with. Besides the great variation which is shown within the ordinary limits of specific differences, there are two extreme forms which, without as complete a series of connecting forms as there

is in Mr. Dall's collection, would undoubtedly be called distinct species. One of these two varieties is represented by only two specimens, one of which is somewhat worn and mutilated, while the other is in good condition, and bears a number of gonangia. This variety is much more robust than any of the normal forms, the branches being an eighth of an inch wide; the hydrothecæ are very large and swollen in the middle portion; the gonangia are of the kind given as No. 2 in the description. The other variety has slender hydrothecæ which are free for more than half their length, are not swollen in the middle, and the outline from the aperture of the hydrotheca to the stem forms a curve which projects into the hydrotheca, while in the robust form it projects outward; most of the hydrothecæ also have a projection in the shape of a small horn at the inner, inferior angle; some of those on the distal ends of the branches have a well-defined notch in the rim, on the opposite side from the stem, forming a blunt tooth on each outer corner, and between each tooth and the inner margin of the rim there is a slight sinuosity. This character of the rim decreases towards the lower portion of the stems and branches to such an extent, that many of the hydrothecæ have a rim that is entire, or nearly so.

This is not only the most variable, but apparently the most abundant form on the Alaskan coast. In some of its variations it is quite similar to *S. abietina* of the New England shores, Greenland, and the North Cape, which also shows considerable specific variation.

*Sertularia inconstans*, sp. nov. Plate xv., figs. 51, 52.

*Trophosome*. Hydrocaulus erect, simple, constricted at the base, jointed obliquely, internodes of uniform size, densely branched; branches mostly short, arranged alternately, one to each internode, erect, lying close to each other, a few of the larger shoots bear one or two large branches similar to the main stem, divided by transverse joints into internodes of very variable length, constricted at the base, attached to the stem by quite a prominent process, but little branched; branchlets few, short, erect. Hydrothecæ large, swollen at base, a constriction near the distal end, aperture discoidal, rim entire, arranged alternately upon the branches and branchlets; on the lower part of the stem, below the branches, there are two to each internode; on the upper portion of the stem there are usually three to each internode, one on one side

and two on the other; one of the latter being in the axil of the branch.

*Gonosome.* Gonangia sessile, large, orifice terminal, small, discoidal; outline very irregular, tapering usually at the base; borne in two close-set rows on the distal portion of the main stem.

Height of specimen 45 mm.

*Hab.* Unalashka; beach.

From the character of the trophosome, this species evidently belongs in the same group with *S. abietina* and *S. filicula*, the hydrothecæ agreeing very well in form and arrangement. The mode of growth, however, is quite different, the number and closeness of the branches and branchlets giving to the colony a very dense, plumose appearance.

The gonangia show the greatest amount of variation of any species that I know of; it is impossible to describe their form, for there is not one of them which seems to agree with any other.

*Sertularia thuiarioides*, sp. nov. Plate xiii., figs. 38, 39.

*Trophosome.* Hydrocaulus erect, simple, very slender at the base, largest at the distal end, the middle portion slender and of uniform size, jointed transversely, internodes of variable length, regularly branched; branches sub-erect, short, springing from opposite sides of the stem, but spirally arranged owing to the stem being twisted, much branched, on some of the largest specimens two or three large branches occur, which resemble the main stem in every particular; branchlets short, spreading widely, bearing a few small subdivisions. Hydrothecæ tubular, deeply immersed, with a constriction on the inner side of the distal end, aperture semilunar shape, arranged alternately upon the branches and branchlets, and basal part of the stem; on the upper branched portion the internodes usually bear one hydrotheca on one side, and two hydrothecæ and a branch on the other.

*Gonosome.* Gonangia large, sessile, tapering at the base, ornamented with two pointed horns placed opposite to each other, near the distal end; aperture terminal, discoidal, ornamented with a row of teeth projecting into the gonotheca, borne in single rows on the upper sides of the branches and branchlets.

Height of largest specimen 180 mm.

*Hab.* Bering Sea, 5 miles west of the West Cape of Nunivak Id.; 24 fathoms, sand. Chignik Bay, Alaska; 11 to 16 fathoms, sand.

I have not been able to make out any distinct opercula, but in



one or two instances have noticed a minute piece of membrane, with a ragged edge, hanging from the rim of a hydrotheca. The hydrocaulus is very characteristic, the distal part being often twice the size of the basal portion.

**Sertularella tricuspidata**, Hincks. Plate xii., figs. 26, 27.

There are specimens of a *Sertularella*, collected at four or five different localities, which I at first thought to be a new species, and closely allied to *S. tricuspidata*, but upon examining them more closely, I find them to be robust forms of the above-named species.

The gonangia are very abundant, and are borne in rows on the upper side of the branches.

*Hab.* Semidi Islands, Alaska; 15 to 25 fathoms, gravel, June 10th; gonangia abundant. Popoff Straits, Shumagin Islands. Unalashka; beach. Port Etches, Alaska; 12 to 18 fathoms, clayey mud. Yukon Harbor, Big Koniushi, Shumagin Islands; 6 to 20 fathoms, gravel, July 7th. Kyska Harbor; 10 fathoms, rocky, July 15th. Iliuliuk, Unalashka; 13 fathoms, stony.

There is one specimen which is much more delicate than any of the others, but differs in no essential characters. The gonangia are not present.

*Hab.* Semidi Islands, Alaska; 15 to 25 fathoms, gravel, June 10th.

**Sertularella rugosa**, Gray. Plate xiii., fig. 31.

This species, which has only been found upon the New England coast at low water, is represented on the shores of Alaska by a stout form, which was found in from six to twenty fathoms. Although the gonangia are not present, the trophosomes are so characteristic that I do not hesitate to refer them to this species.

Height of the largest shoot 30 mm.

*Hab.* Iliuliuk, Unalashka; on kelp, Oct. 23, 1871. Yukon Harbor, Big Koniushi, Shumagin Islands; 6 to 20 fathoms, sand and rocks, July 17th. St. Paul Island (Pribiloff group); 9 fathoms, sand, on kelp ground. Cape Etolin, Nunivak Island; 8 fathoms, stony.

**Sertularella polyzonias**, Gray. Plate xiii., figs. 34, 35.

A number of very fine specimens of this widely distributed species are in the Alaskan collection. They vary but very slightly from the New England specimens, the hydrothecæ and gonangia

being on the average a trifle stouter, and the whole colony has a more luxuriant growth.

The gonangia are very abundant, and are borne on the sides of the stems, midway between two hydrothecæ. Our specimens are all from two localities.

Height of largest specimen 70 mm.

Port Etches, Alaska; 12 to 18 fathoms, clayey mud. Five miles southwest of the West Cape of Nunivak Id.; 30 fathoms, sand.

*Sertularella robusta*, sp. nov. Plate xiii., figs. 32, 33.

*Trophosome*. Hydrocaulus simple, erect, stout, flexuous, four or five annulations at the base, divided by transverse joints into internodes of variable length, sparingly and regularly branched; branches erect, varying greatly in length, those near the base of the hydrocaulus being longest, and like the upper and shorter ones extending to the distal end of the stem, flexuous, constricted at the base, the larger ones bearing a few branchlets. Hydrothecæ very large, operculated, deeply immersed in the stem, only enough of the distal end to include the teeth being free, curving slightly outward, the inner angle of the base somewhat produced downwards toward the centre of the stem, the rim armed with four stout teeth; operculum consists of four segments.

*Gonosome*. Gonangia axillary, very large, sessile, ovate, marked with about eight very prominent transverse bands; orifice terminal at the extremity of a short tube, with an entire rim.

*Hab.* Yukon Harbor, Big Koniushi, Shumagin Islands; 6 to 20 fathoms, sand and rocks, July 7th.

This is one of the stoutest forms of all the numerous *Sertulariidae* from the Alaskan coast; and the large size and conspicuous position of the gonangia contribute to make it the most imposing of all the known members of the family. It has a very rigid, angulated habit, more like some of the stouter species of *Sertularia*, e. g., *S. abietina*, than the graceful curved mode of growth usually found in *Sertularella*. The shape and arrangement of the hydrothecæ is also similar to that usually found in the genus *Sertularia*, and the deep immersion of the hydrothecæ in the stem remind one of the forms belonging to the genus *Thuiaria*.

The stem, branches, and branchlets are all of about the same width, 1 mm. Height of largest colony 50 mm. Length of gonangia 5 mm., width 2 mm.

It is quite interesting to note that while this species is undoubtedly a good *Sertularella*, as is indicated by the form and structure of the gonangia and the operculated hydrothecæ, it also possesses some of the characteristics of the genera *Sertularia* and *Thuiaria*, thus still more closely connecting these different members of the family *Sertulariidae*.

***Sertularella pinnata*, sp. nov.** Plate xii., figs. 28, 29.

*Trophosome.* Hydrocaulus simple, erect, straight, much and pinnately branched, divided by transverse joints into short internodes, each of which bears a single branch; shoots occurring in dense clusters; each shoot widest in the middle and tapering more rapidly towards the base than to the distal extremity; branches short, sub-erect, not all in the same plane, inclining towards each other on the upper side of the stem, divided into short internodes, but little subdivided, occasionally a long branch occurs near the base, which is similar to the main stem in all respects. Hydrothecæ short, tubular, wide-mouthed, rim ornamented with three large teeth, two of which are usually on the outer side, not all in the same plane, but inclining towards each other, so that in a general view they appear to be arranged uniserially; hydrothecæ on the pinnæ arranged alternately, one to each internode and on the main stem one in each axil. Gonangia ovate, sessile, axillary, marked with about eight very strong transverse ridges, which, in most of the specimens, have an irregular, wavy outline, orifice terminal, central, discoidal; borne in two rows, in the axils, on the basal half of the stems.

Height of finest specimens 35 mm.

*Hab.* Unalashka; beach, low water, after gale, September; growing in dense tufts on sea-weeds, gonangia abundant. Coal Harbor, Shumagin Islands; low water, attached to fuci and sponges, gonangia abundant. Lituya Bay; 9 fathoms, sandy mud; gonangia present. Lituya Bay; 112 fathoms.

This is a very distinct form, well characterized by the pinnate arrangement of the branches, the arrangement of the hydrothecæ, and by the structure and arrangement of the gonangia.

***Thuiaria cylindrica*, sp. nov.** Plate xvi., fig. 57.

*Trophosome.* Hydrocaulus erect, simple, stout, gradually tapering from the distal end to the base, divided by oblique joints into internodes of very variable length, three or four annulations at

the base, regularly branched; branches cylindrical or polygonal, arranged alternately, bearing from one to three branchlets near the base which are of equal size and nearly equal length with the branches, or unbranched; constricted at the base; occasionally a large branch occurs which resembles the main stem in every particular. Hydrothecæ tubular, entirely immersed, tapering at the distal end, curved slightly outwards, aperture oval, those upon the stem are arranged in two opposite rows on the same sides with the branches, three between each two branches; those upon the branches and branchlets are in regular rows of from four to six in number. *Gonosome*. Gonangia unknown.

Height of largest specimen 130 mm.

*Hab.* Port Möller, Aliaska Peninsula; 5 to 17 fathoms, sand, August. Hagmeister Island, Bering Sea; beach. Chirikoff Island; beach. Chiachi Islands; 8 to 15 fathoms, gravel.

There is considerable variation in the mode of growth of this species. The largest specimen has a straight stem with short pinnate branches, not over half an inch (13 mm.) long, and bearing but few very short branchlets. Another specimen has a twisted stem, giving a very graceful, spiral form to the colony; and four or five of the specimens in which the branches bear long spreading branchlets have a stout plumose form as if the branches originated from all sides of the stem.

***Thuiaria robusta***, sp. nov. Plate xv., figs. 53, 54, 55.

*Trophosome*. Hydrocaulus simple, erect, slender at the base, gradually increasing in size to the distal end, divided by transverse joints into internodes of uniform size, a few annulations at the base, regularly branched; branches short, spreading, curving outwards and downwards, springing from all sides of the stem, one to each internode, bearing four or five branchlets, internodes of unequal size; branchlets few, short and diverging at a wide angle. Hydrothecæ vary greatly in form, those upon the branchlets and extremities of the branches curve quite strongly outwards, may be immersed up to the aperture in the stem, or the distal third may be free, aperture large, bi-labiate, with the broad side towards the stem; those upon the median portions of the branches are long, completely immersed, aperture smaller and not as distinctly bi-labiate as those upon the branchlets; those upon the proximal portion of the branches are shorter than the others, much smaller, aperture large, slightly bi-labiate with a singular

process of the perisarc in the shape of a two-pointed pyramid at the base of each hydrotheca; all the hydrothecæ upon the branches and branchlets are arranged sub-alternately; those upon the main stem are similar to those of the proximal portions of the branches, usually two to each internode which are placed about opposite to each other, occasionally a third one occurs in the axil of the branch. The perisarc is unusually thick, and especially so in the basal third of the hydrocaulus where the diameter of the cavity of the cœnosarc is not more than a third of that of the stem.

*Gonosome.* Gonangia largest at distal end tapering to the base, sessile, about twice the length of the hydrothecæ, not including the horns, armed with two stout, cylindrical, truncate horns placed on opposite sides of the aperture near the distal end, aperture terminal, discoidal.

*Hab.* Sea Horse Islands, Arctic Ocean; 23 fathoms, mud and gravel. Hagmeister Island, Bering Sea; beach. Cape Prince of Wales, Arctic Ocean; mud. Bering Sea, 12 miles east of King's Island; 17 fathoms, mud.

*Thuiaria plumosa*, sp. nov. Plate xvi., fig. 62.

*Trophosome.* Hydrocaulus simple, erect, very slender at the base, increasing in size to the distal end, somewhat twisted, jointed transversely, internodes of the proximal portion of very unequal length, some being three times the length of others, those of the upper portion are quite uniform, regularly branched; branches short, arranged alternately, one to each internode, but owing to the twist in the stem take on a spiral form, the uppermost erect, lying close to the stem, the lower ones curve outwards, attached to the stem by a very prominent process, bearing a few branchlets, regularly jointed; branchlets do not extend beyond the ends of the branches, and lie close to the latter. Hydrothecæ largest at the base, tapering slightly outwards, entirely immersed, aperture towards the stem, the outer side produced, rim ornamented with two large teeth placed on the outer side, two tooth-like processes of the perisarc also occur in the base of each hydrotheca, arranged subalternately upon the branches and branchlets; upon the stem there are three to each internode, two placed opposite to each other, and one in the axil of the branch. *Gonosome.* Gonangia sessile, very long and narrow, tapering gradually to the base, ornamented with two short

horns placed on opposite sides of the orifice near the distal end, orifice terminal large; borne in single rows on the upper side of the branches and branchlets.

Height of largest specimen, 40 mm.

*Hab.* Bering Sea, 5 miles southwest of the west cape of Nuni-vak Island; 30 fathoms, sand. Icy Cape, Arctic Ocean; 15 fathoms, sand.

In general appearance this species cannot be distinguished from *Sertularia thuiarioides*, and even in some of the details of structure they bear a very close resemblance to each other; the best distinguishing characteristic in the trophosomes is the form of the aperture in the hydrothecæ, and in the gonosome the size and relative proportions of the gonangia. The twist in the stem and the erect position of the branches give to this species a very graceful mode of growth, which bears a striking resemblance to a feather.

*Thuiaria turgida*, sp. nov. Plate xvi., figs. 58 to 61.

*Trophosome.* Hydrocaulus simple, erect, stout, straight or slightly flexuous, of nearly uniform size throughout, joints oblique, internodes short, of equal size, annulated at the base, the lower portion without branches, the upper or distal part regularly branched; branches broad, short, arranged alternately, one to each internode, constricted at the base, attached to quite a prominent process from the stem, with one annulation, divided by transverse joints into internodes of variable length, sparingly branched; branchlets diverging from the branches at a wide angle, usually curving towards each other. Hydrothecæ large, tubular, deeply immersed in the stem, curving slightly outwards, aperture large, rim entire, arranged oppositely on the branches and branchlets; on the upper portion of the stem there are three to each internode, a pair opposite to each other, and one odd one in the axil of the branch; on the lower part of the stem there are two to each internode. *Gonosome.* Gonangia large, swollen, sessile, with three to five stout, longitudinal ridges, orifice terminal, small, discoidal; arranged in two closely set rows on the upper portion of the main stem.

Height of largest specimen, 140 mm.

*Hab.* Port Etches; 5 to 8 fathoms, gravel and stones, May 30. Popoff Straits, Shumagin Islands; near edge of reef in 6 fathoms, July. Semidi Islands; 15 to 28 fathoms, gravel, June 10. Coal

Harbor, Shumagin Islands; beach. Eider village, Unalashka; 25 to 30 fathoms, sandy mud, June 4. Hagmeister Island, beach. Unalashka; 6 fathoms, Nov. 11. Kyska Harbor, Aleutian Islands. Lituya Bay; 9 fathoms, sandy mud. Akutan Pass, near Unalashka. St. Paul Island (Pribiloff group); 9 fathoms, in kelp, July 24. Middleton Island; 12 fathoms, gravel, June 2.

This species is one of the most abundant in the collection. It is a showy form, and has quite a stout appearance, owing to the width of the branches and stem throughout, and the large gonothecæ forming a double, close-set row along the distal third of the stem add not a little to its showiness.

**Thuiaria gigantea**, sp. nov. Plate xvi., figs. 63, 64.

*Trophosome*. Hydrocaulus simple, erect, rooted by a creeping stolon, stout, straight, divided by transverse joints into internodes of variable length, much and quite regularly branched; branches suberect, short, stout, usually unjointed, seldom branched all in one plane, arranged alternately on opposite sides of the stem from within an inch of the base to the very tip, constricted at the base. Hydrothecæ large, deeply immersed, curving outwards, orifice large, somewhat elliptical, arranged subalternately upon the stems and branches. *Gonosome*. Gonangia borne in two rows on the upper sides of the branches and branchlets, usually occurring towards the distal ends of the stems, sessile, obovate, with an irregular outline, orifice terminal, large, discoidal.

Height of largest specimen, 165 mm.

*Hab*. St. Paul Island, Bering Sea. Hagmeister Island; beach. Akutan Pass, near Unalashka. Kyska Harbor; 10 fathoms, rocky, July 15.

The finest specimens consist of a dense cluster of about 350 shoots, averaging six inches in length, attached to a large barnacle; it is much the largest single specimen in the collection, containing just about one million individuals, exclusive of the reproductive zooids, and it can just be crowded into a two-quart jar. The conditions for the existence of life must be very favorable where such a luxuriant growth as this is obtained from a root-stock that covers only a piece of an old barnacle shell.

**Macrorhynchia Dallii**, sp. nov. Plate xi., figs. 18, 19, 20.

*Trophosome*. Hydrocaulus erect, compound, very stout, black, straight or gracefully curved at the distal end, not divided by

joints, the lower portion sometimes as much as the lower third, bearing no pinnæ, but give origin to two or three branches which often equal the main stem in size, and resemble the latter in every particular, the upper portion bears a double row of closely set pinnæ. Pinnæ arranged alternately on opposite sides of the stem and branches, gracefully curved, more or less, towards each other, giving off near their origin from one to three branches, which are exact copies of the main pinnæ, equal the latter in length, and lie so closely upon each other, that they are not noticed in a casual glance; both the pinnæ and their branches are divided by transverse joints into short internodes. Hydrothecæ arranged uniserially upon the pinnæ and their branches, one to each internode, narrowest at the base, rim entire and slightly flaring. Nematophores simple, very large, the distal portion free, semicylindrical, very broad, one on either side and at the upper edge of the hydrothecæ, facing inwards, one just below each hydrotheca, and on the main pinnæ, sometimes two, one directly below the other, there are also two or three near the base of the gonangia irregularly arranged.

*Gonosome.* Gonangia very large, quite regularly cylindrical, tapering at the base, sessile, mouth discoidal and the full size of the gonangia, rim entire; scattered over the pinnæ and their branches.

Height of finest specimen 225 mm. Width of largest hydrocaulus at base 5 mm. Length of largest gonangium 4 mm.

*Hab.* Unalashka; beach. Akutan Pass, near Unalashka; beach.

This is one of the largest, stoutest, and by far the showiest and most elegant species in the collection, and I take pleasure in naming it after Mr. Dall, through whose untiring labor and skilful care this fine collection has been made, and kept in a good state of preservation.

In the mode of growth and external characters this species has all the appearances of a true *Aglaophenia*, and the large cylindrical gonangia partially hidden by the dark-colored pinnæ are readily mistaken for corbutæ.

### ATHECATA.

*Tubularia borealis*, sp. nov.

*Trophosome.* Hydrocaulus simple, erect, slightly annulated or twisted at the base, largest at the distal end and tapering gradually to the base, smooth, not forming a collar-like expansion below



the hydranth, light straw-color. Hydranths large, drooping; proximal tentacles thirty to thirty-two in number, arranged in a single verticil; when expanded forming a circle with a diameter of twenty to twenty-four mm.; distal tentacles fifty to sixty, arranged in a double row so closely as to form a single verticil. *Gonosome*. Gonophores oviform with four crest-shaped, laterally compressed, tentaculiform processes, arranged in pendant racemes of six to nine in number, which, when mature, are twice the length of the hydranth, and bear from thirty to seventy sporosacs each. No radiating canals are discernible in these alcoholic specimens, yet they may exist.

Length of stem 60 mm.

*Hab.* Hagmeister Island; beach, low-water.

In general appearance this species bears quite a close resemblance to *Tubularia indivisa*; the light-yellow, stout stems, and the large heads of both would hardly fail to mislead one at a casual glance. If there really are no gastrovascular canals in the sporosacs this form belongs in the sub-genus *Parypha* of Agassiz, but if the canals are present it makes it a still more interesting form, it then being intermediate between the sub-genera *Tubularia* proper of Agassiz, and *Parypha* of Agassiz.

***Tubularia indivisa*, Linne.**

A number of very characteristic specimens of this widely-distributed species have been received from Alaska. The stems are very much interlaced, and many younger ones have attached themselves to older stems, thereby producing a branched appearance. Where the young stems have become closely twined about the older ones, it gives to the latter an appearance like that of the large confluent stem of *Halecium muricatum*.

*Hab.* St. Michael's, Norton Sound; collected by Mr. L. M. Turner, who describes them as very abundant in small pools left by extreme low tides.

***Eudendrium pygmæum*, sp. nov.**

*Trophosome*. Hydrocaulus simple, erect, stout, rooted by a creeping stolon, annulated throughout, irregularly branched; branches erect, and bearing but few branchlets. Hydranths large, the stout tentacles, which vary in number from sixteen to twenty, are arranged in a single verticil. *Gonosome*. Sporosacs arranged in crowded rows beneath the tentacles, nearly spherical or pointed

at the distal end, and from thirty to forty-five or even fifty in a cluster.

Height of specimen 20 mm.

*Hab.* Akutan Pass, near Unalashka.

This is a short, stout form, of a blackish-brown color at the base, becoming lighter towards the distal ends of the branches. It resembles the dried stems of a *Eudendrium* that occurs at Santa Cruz, California, in being annulated throughout, and may prove to be identical.

Nov. Fam. (?) RHIZONEMIDÆ, S. F. Clark.

Polypites attached by numerous thread-like fibres. Tentaculæ apparently of two kinds; the inner verticil of aboral tentacles branched.

Nov. Genus **RHIZONEMA**, Clark.

Polypes solitary, unconnected. Basal portion of the polypite swollen, mammillate, with the thread-like processes for attachment developed therefrom.

Type *Rhizonema carnea*, sp. nov.

Stems stout, unbranched, smallest at the distal end; of a nearly uniform size for two-thirds of the distance toward the base, at which point they begin to increase in diameter rapidly to twice the diameter of the distal end, then taper rapidly to quite a sharp point like an acorn. The processes for attachment are developed in large numbers (hundreds) from the basal surface of the enlarged portion of the stem. They are of a light-brown color, and form a matted mass which extends beyond the sharp-pointed base. The polype is large and turgid; its length much greater than its width. The aboral tentacles are about forty in number, very slender and delicate, reaching a trifle beyond the end of the proboscis. Just within these tentacles is situated another circle of processes, the exact nature of which can be determined only from fresh specimens.

The proboscis is very large and swollen, and bears around its distal end the proboscidial tentacles, which are as delicate as the finest thread, very numerous, and so matted together in the specimen before me that it is impossible to form any correct estimate of their number. The mouth, situated at the extremity of the

proboscis, is very large. Length of head, 13 mm. Length of swollen basal portion, 21 mm. Total length of perfect specimen, 68 mm.

The specimens from which the above description was written were collected at St. Michael's, Norton Sound, Alaska, Oct. 17, 1875, by Mr. Lucien M. Turner, U. S. Signal Service, who appends the following note: "These specimens were of a deep coral red when found. They are not common. From the sea."

They are two in number, one of which is perfect—the other is without a head, but bears at the distal end a thin chitinous membrane surrounding the stem; its edges recurved and marked with a few faint radiating lines.

From the appearance of the individual, I am of the opinion that the head had been thrown off, and that another was about to be developed.

The matted masses of delicate fibres about the basal portion present a very peculiar appearance.

When cleared away so as to expose the pointed basal end of the stem, that part has a close resemblance in miniature to a beet-root with an unusual number of fibrous rootlets.

Under the microscope, each fibrous process appears to be developed from a small rounded papilla; some papillæ which bore no fibres exhibited an opaque milk-white nucleus. The nature and development of these processes is a matter of considerable interest, but I think that little could be done even with a large supply of only alcoholic specimens. The nature of the inner verticil of aboral tentacles (?) is also a very interesting question. From their position, and from their compound appearance, they would naturally appear to be clusters of reproductive bodies. On the other hand, the alcoholic specimens under the microscope do not show the structure characteristic of such bodies. They appear to be thin, flattened, branched tentacles, and have no swelled or thickened portions such as would indicate anything like reproductive organs. It is, of course, impossible to determine their nature positively without further material.

This is certainly a very peculiar and very interesting form, on account of its peculiarly shaped base, its apparently compound tentaculæ, and the thread-like processes for attachment, which seem, on account of the pointed base, to be necessary for its secure anchorage.

ORDER **LUCERNARIÆ.**Family **ELEUTHEROCARPIDÆ**, H. J. Clark.**Halyclystus auricula**, H. J. Clark.

Twenty or thirty good specimens of this interesting form have been collected at St. Michael's. They are in good preservation, and represent various stages of development. In some of the larger specimens the ovaries are very far advanced, much enlarged, nearly filling the entire cavity, and greatly distending the body walls. In others the ovaries show no enlargement, and between these two conditions all intermediate stages are represented.

The color is light brown, with a bluish tinge, which becomes darker with the development of the ovaries. Three of the specimens have ten arms and three have twelve, showing a marked tendency to variation in this respect.

Geographical distribution: St. Michael's, Norton Sound, Alaska; Mr. L. M. Turner, Oct. 17, 1875. Vardöe Islands, Norway; Rathke. Faröe Islands; Steenstrup. English coast; Montague, Fleming, Johnston, and others. South coast of Greenland; Steenstrup. Anticosti; Hyatt, Verrill, and Shaler. Massachusetts Bay; H. J. Clark.

## EXPLANATION OF PLATES.

The figures on plates vii. to xi., inclusive, are enlarged 30 diameters, with the exception of Nos. 16, 19*e* and 19*g*; the extent to which the latter are magnified is indicated on the plates.

The figures on plates xii. to xvi., inclusive, are magnified 20 diameters, with the exception of No. 33, which is enlarged 7 diameters.

## PLATE VII.

Fig. 1. *Gonothyrea hyalina*; *a*, hydrothecæ; *b*, gonangium; *c*, extra-capsular medusoids with tentacles; *d*, cœnosarc, or fleshy axis.

Fig. 2. The same; portion of a branch, showing the arrangement of the hydrothecæ.

Fig. 3. *Campanularia circula*; showing, *a*, hydrotheca; *b*, main stem, and the verticillate arrangement of the pedicels around the stem.

Fig. 4. *Campanularia denticulata*; the hydrothecæ, showing the variation in shape and size. Specimen from Port Etches; creeping on Lafoëa.

#### PLATE VIII.

Fig. 5. *Campanularia compressa*; *a*, gonangium; *r*, rootstock or creeping stem.

Fig. 6. The same; showing the variation in size and form of the hydrothecæ.

Fig. 7. *Campanularia urceolata*; *a*, hydrothecæ; *b*, gonangium.

Fig. 8. *Campanularia turgida*; *a*, hydrotheca; *b*, gonangium; *r*, rootstock.

#### PLATE IX.

Fig. 9. *Campanularia integra*; showing the variation in the hydrothecæ.

Fig. 10. The same; *b*, gonangium; *r*, rootstock.

Fig. 11. *Campanularia speciosa*; *a*, hydrothecæ; *r*, rootstock, or creeping stem.

Fig. 12. *Clytia Johnstoni*; showing the variations in the stems and hydrothecæ.

#### PLATE X.

Fig. 13. *Halecium scutum*; *a*, hydrothecæ; *b*, gonangia; *c*, ova; *d*, aperture of gonangia.

Fig. 14. The same; *a*, portion of a branch; *b*, portion of main stem.

Fig. 15. *Halecium muricatum*; gonangium.

Fig. 16. *Halecium plumularioides*; *a*, portion of a branch; *b*, portion of main stem; *c*, hydrothecæ.

Fig. 17. The same; *a*, branch; *b*, main stem; *r*, rootstock.

#### PLATE XI.

Fig. 18. *Macrorhynchia Dallii*; *b*, main stem; *a*, pinnæ; *c*, hydrothecæ; *d*, nematophores.

Fig. 19. The same; *e*, a cross section of main stem near the base; *g*, gonangium; the other letters as in fig. 18.

Fig. 20. The same; the letters as before.

Fig. 21. *Lafoëa pocillum* ?; *a*, hydrothecæ; *r*, rootstock.

#### PLATE XII.

Fig. 22. *Lafoëa fruticosa*; *a* branch with hydrothecæ. Shumagin Islands, 6 to 20 fathoms.

Fig. 23. *Lafoëa dumosa*; *a*, main stem; *b*, hydrothecæ.

Fig. 24. *Lafoëa gracillima*; *a*, main stem; *b*, hydrothecæ.

Fig. 25. *Calycella syringa*; *a*, hydrothecæ; *b*, opercula; *r*, rootstock.

Fig. 26. *Sertularella tricuspidata*; slender variety, from the Semidi Islands.

Fig. 27. The same; stout variety, also from the Semidi Islands.

Fig. 28. *Sertularella pinnata*; portion of a branch.

Fig. 29. The same; *a*, portion of a branch; *b*, gonangium; *c*, internal chamber.

Fig. 30. *Sertularia filicula*; *a*, main stem; *b*, branches.

#### PLATE XIII.

Fig. 31. *Sertularella rugosa*; portion of a branch with hydrothecæ, from the Shumagin Islands.

Fig. 32. *Sertularella robusta*; portion of a branch; *a*, hydrothecæ; *b*, opercula.

Fig. 33. The same; gonangium.

Fig. 34. *Sertularella polyzonias*; *a*, hydrothecæ.

Fig. 35. The same; gonangium; *r*, rootstock.

Fig. 36. *Diphasia mirabilis*; portion of a branch.

Fig. 37. *Sertularia cupressoides*; *a*, portion of a branch; *b*, portion of main stem.

Fig. 38. *Sertularia thuiarioides*; *a*, gonangia; *b*, portions of branches.

Fig. 39. The same; *a*, portion of a branch; *b*, gonangium.

#### PLATE XIV.

Fig. 40. *Sertularia variabilis*; portion of a branch.

Fig. 41. The same; a stouter form.

Fig. 42. The same; a form in which the hydrothecæ are more elongated.

Fig. 43. The same; a slender form in which the hydrothecæ are arranged more in pairs; *a*, the apertures where the gonangia were attached.

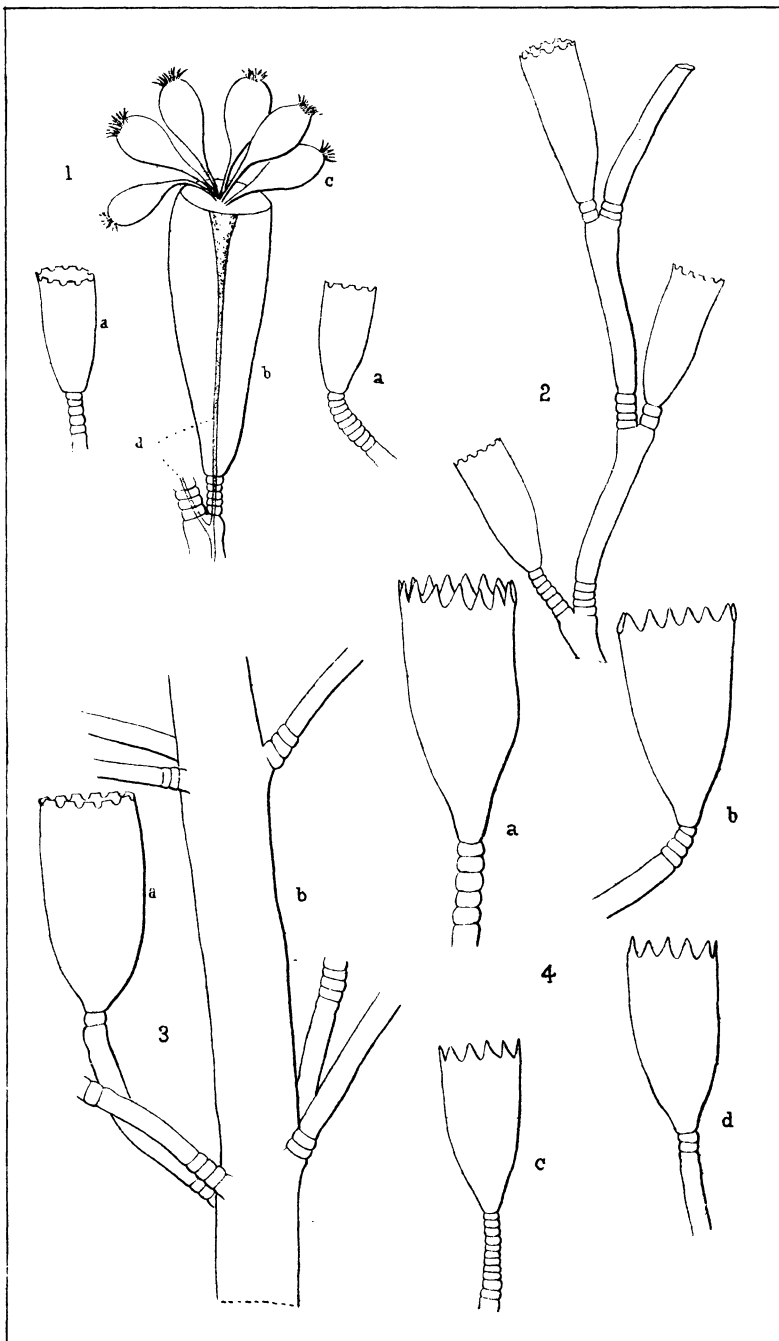
- Fig. 44. The same; *a*, portion of a branch; *g*, gonangia from same colony.
- Fig. 45. The same; a stouter form, in which the hydrothecæ are quite divergent.
- Fig. 46. The same; the stoutest of the many varieties; the three pairs of hydrothecæ are all from the same branch.
- Fig. 47. The same; gonangia.
- Fig. 48. The same; still another form, the divergent characters of which are not constant; not even in different portions of the same colony.

## PLATE XV.

- Fig. 49. *Sertularia variabilis*; the three pairs of hydrothecæ are all from the same stem.
- Fig. 50. The same; the most extreme of the many forms.
- Fig. 51. *Sertularia inconstans*; three gonangia which grew next to each other, showing how variable they are.
- Fig. 52. The same; portion of a branch.
- Fig. 53. *Thuiaria robusta*; *a*, portion of main stem, showing the thickness of the perisarc or chitinous walls; *b*, side view of basal portion of a branch; *c*, side view of portion of stem.
- Fig. 54. The same; *d* and *e*, portions of branches.
- Fig. 55. The same; gonangia.
- Fig. 56. *Sertularia similis*; portion of a branch.

## PLATE XVI.

- Fig. 57. *Thuiaria cylindrica*; showing the unusual arrangement of the hydrothecæ and the mode of branching.
- Fig. 58. *Thuiaria turgida*; gonangium.
- Fig. 59. The same; portion of a branch and branchlet.
- Fig. 60. The same; portion of main stem.
- Fig. 61. The same; portion of a branch.
- Fig. 62. *Thuiaria plumosa*; *b*, portion of a branch; *g*, gonangia.
- Fig. 63. *Thuiaria gigantea*; *a*, side view of main stem; *b*, gonangia; *c*, hydrothecæ.
- Fig. 64. The same; portion of a branch.

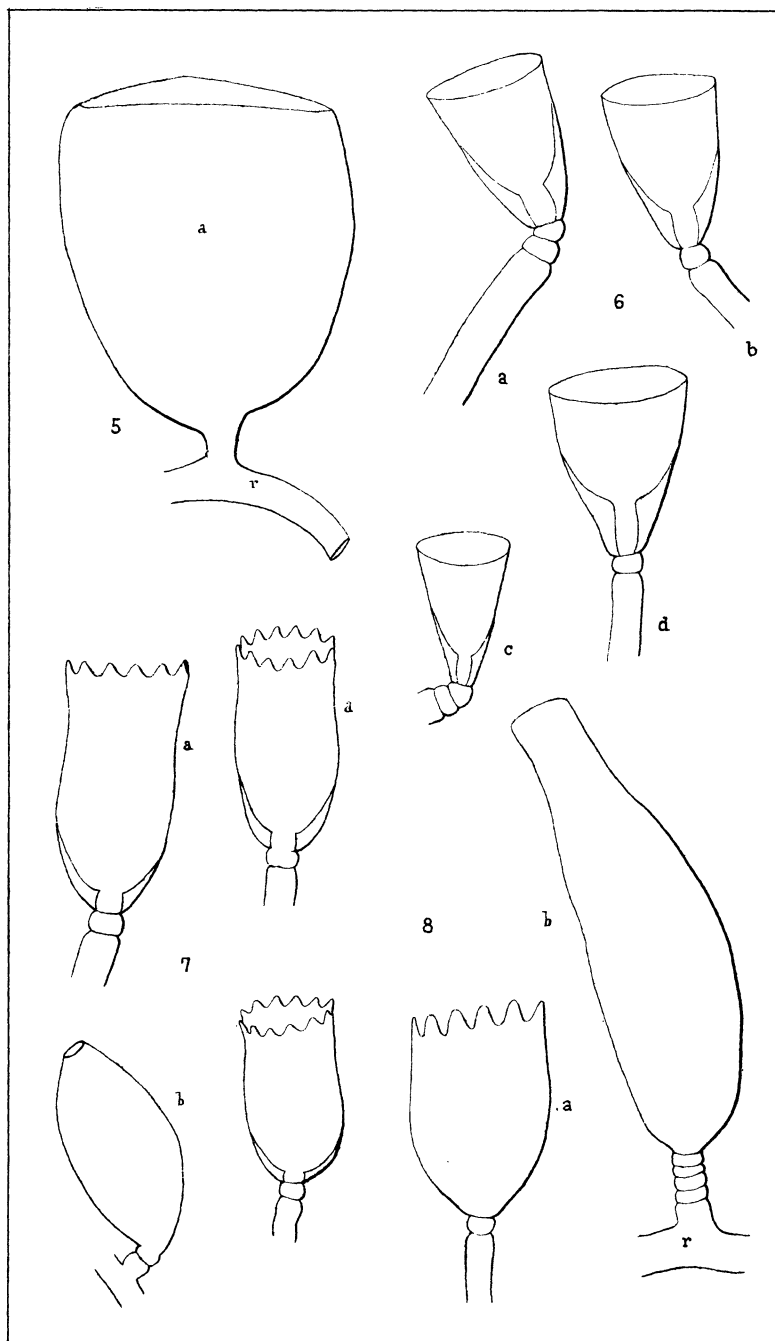


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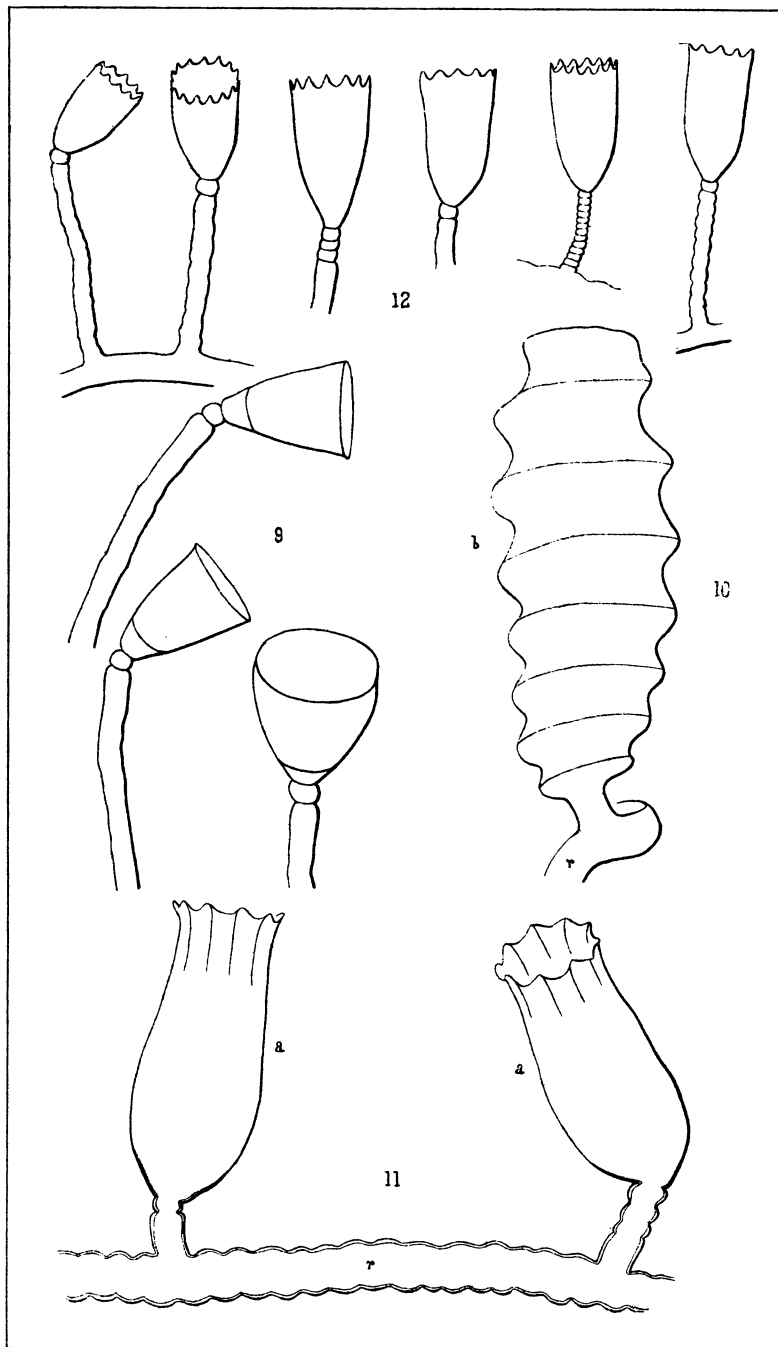




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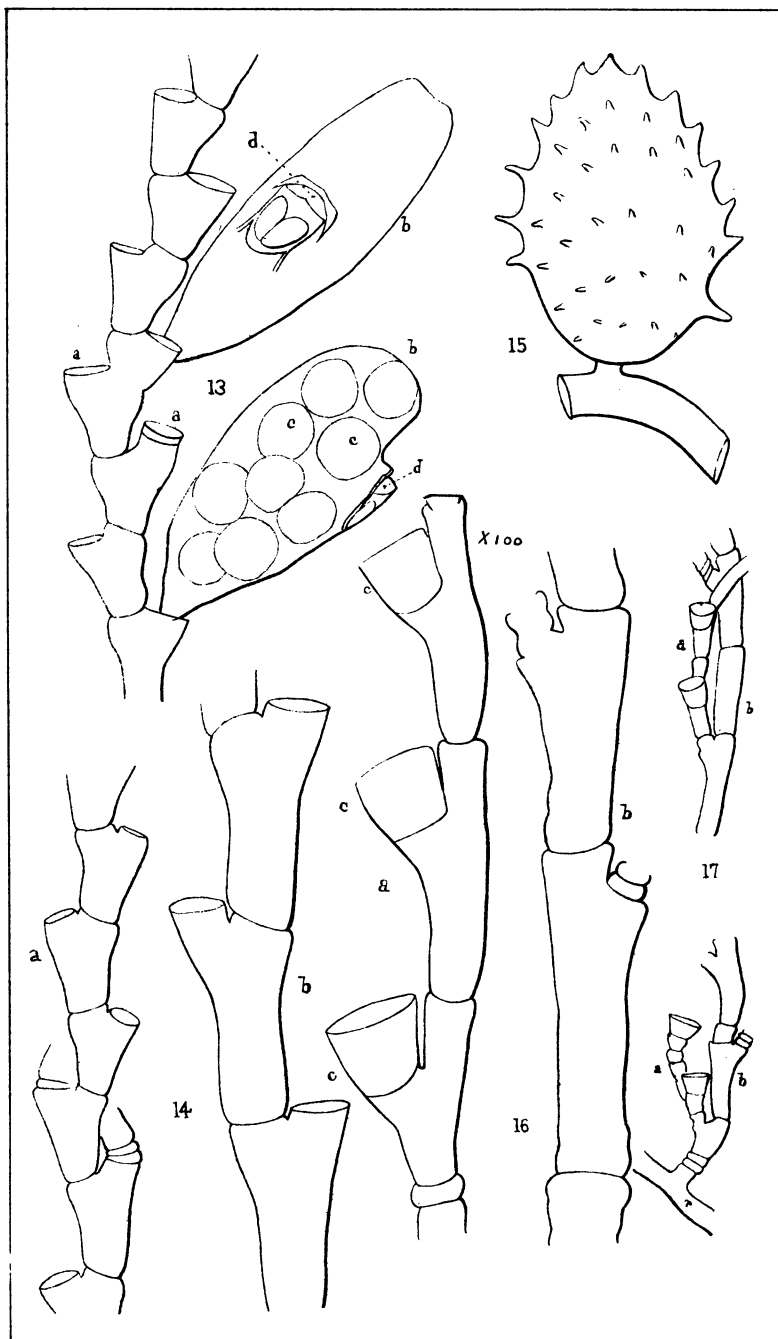
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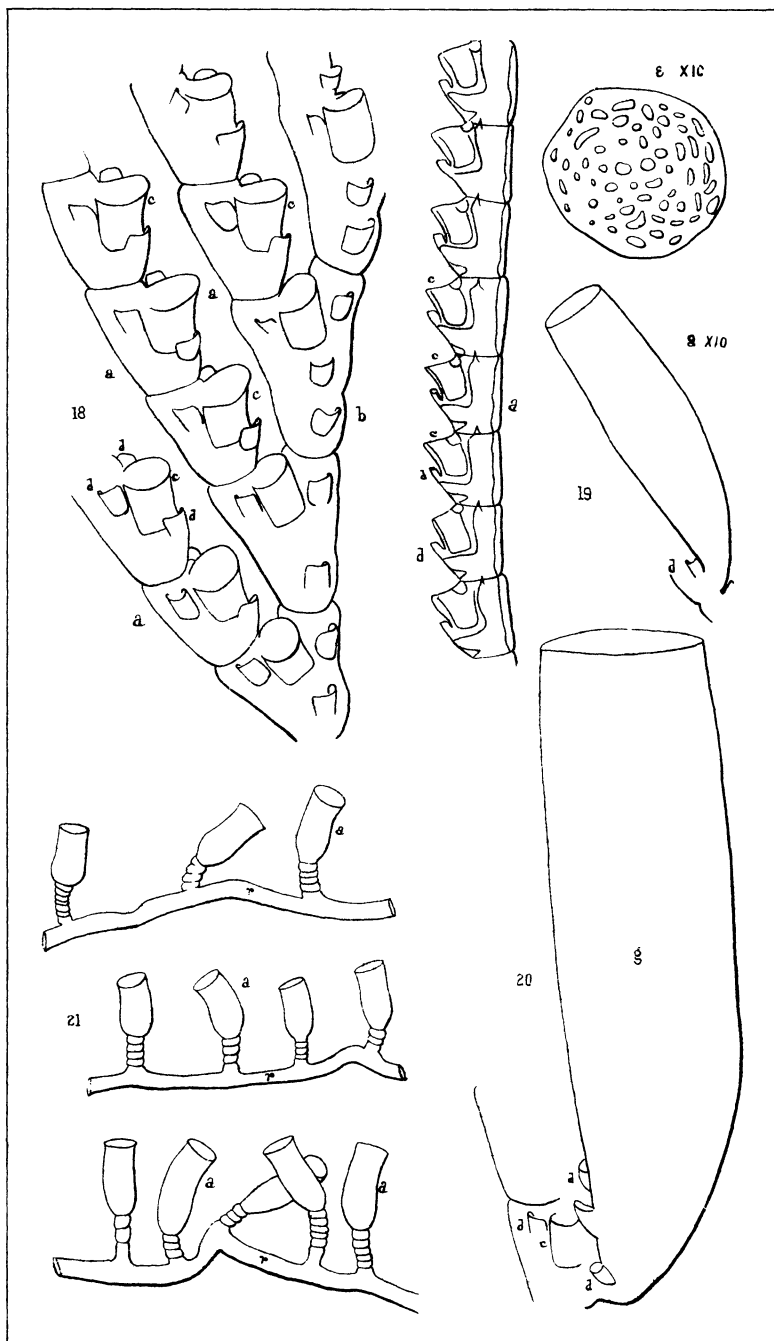
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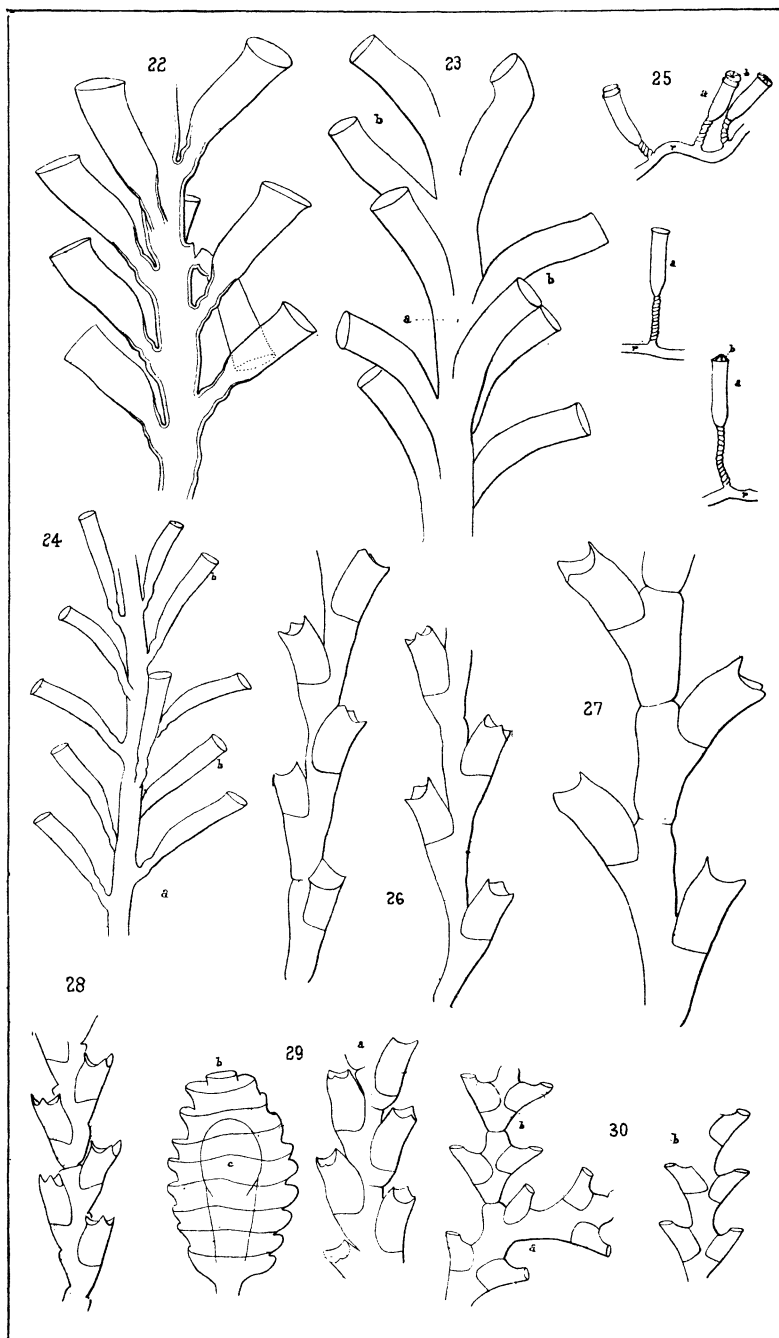
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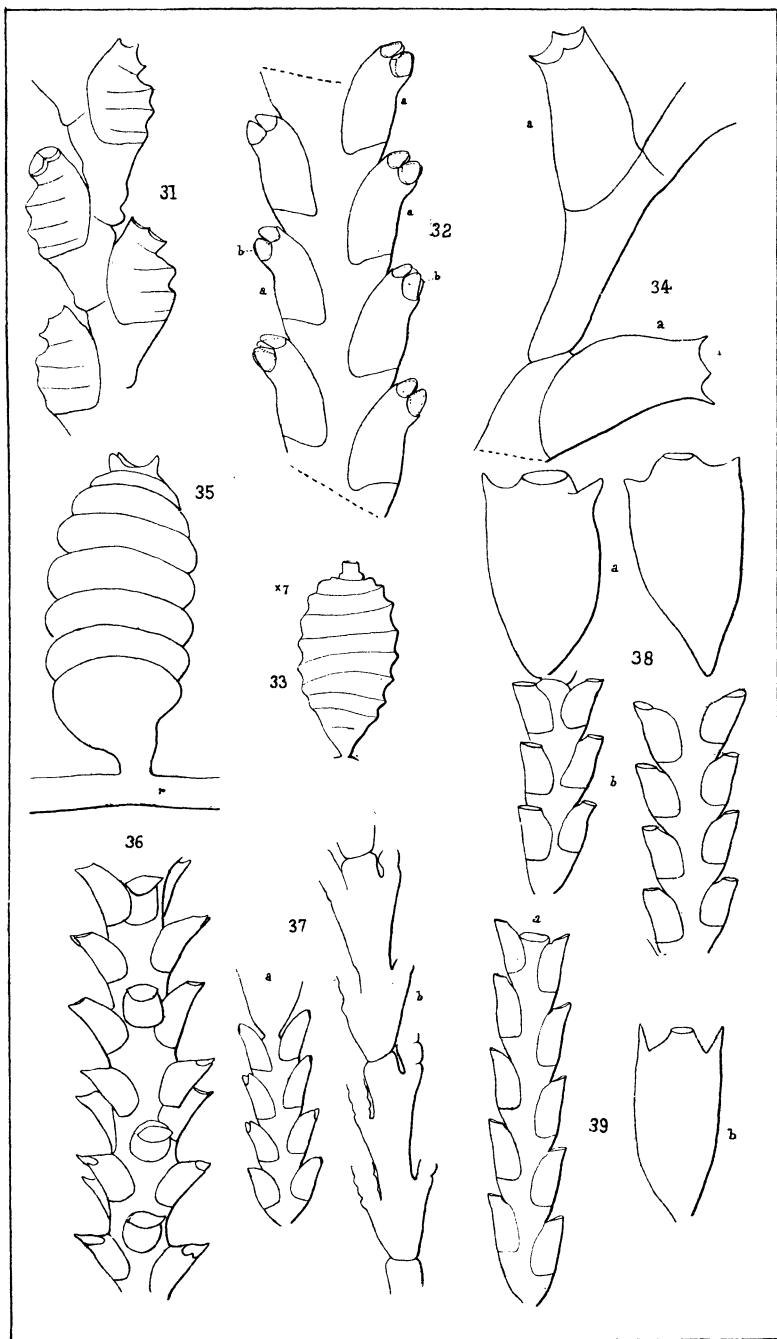
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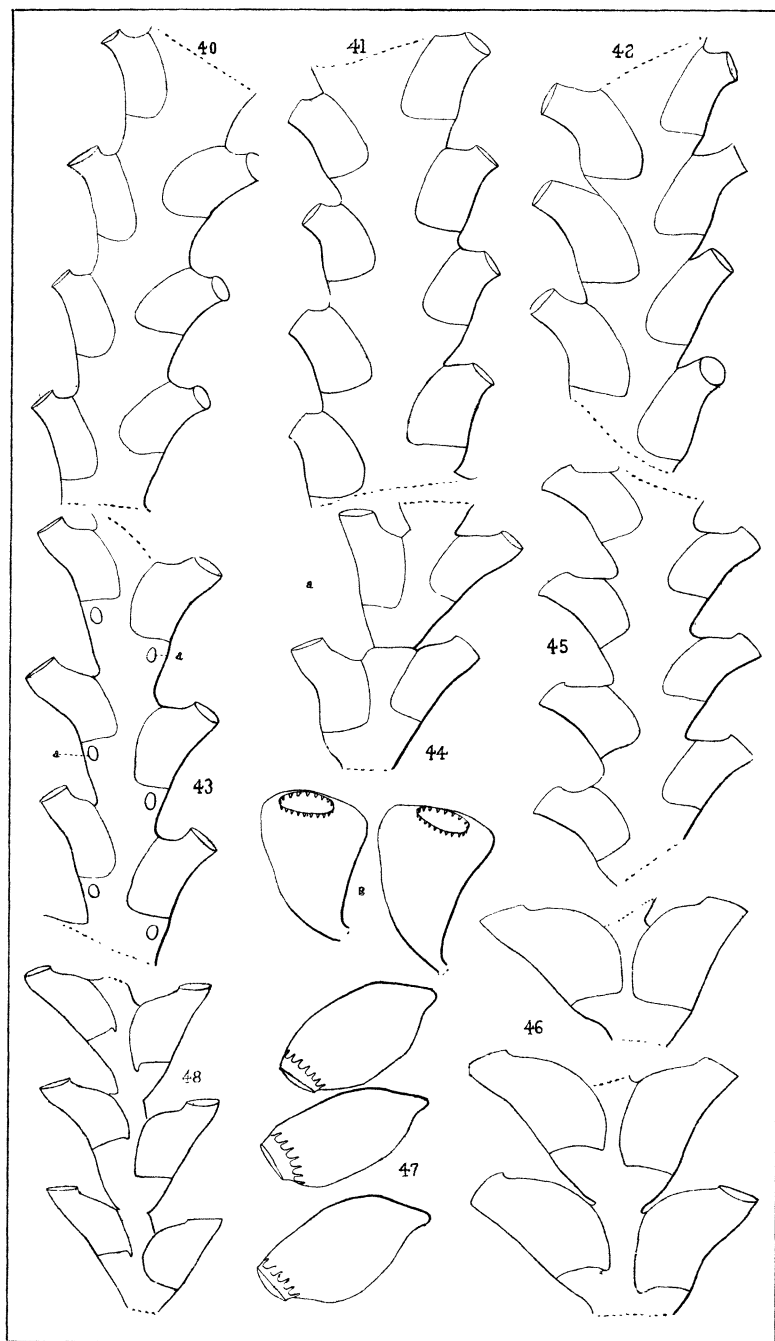
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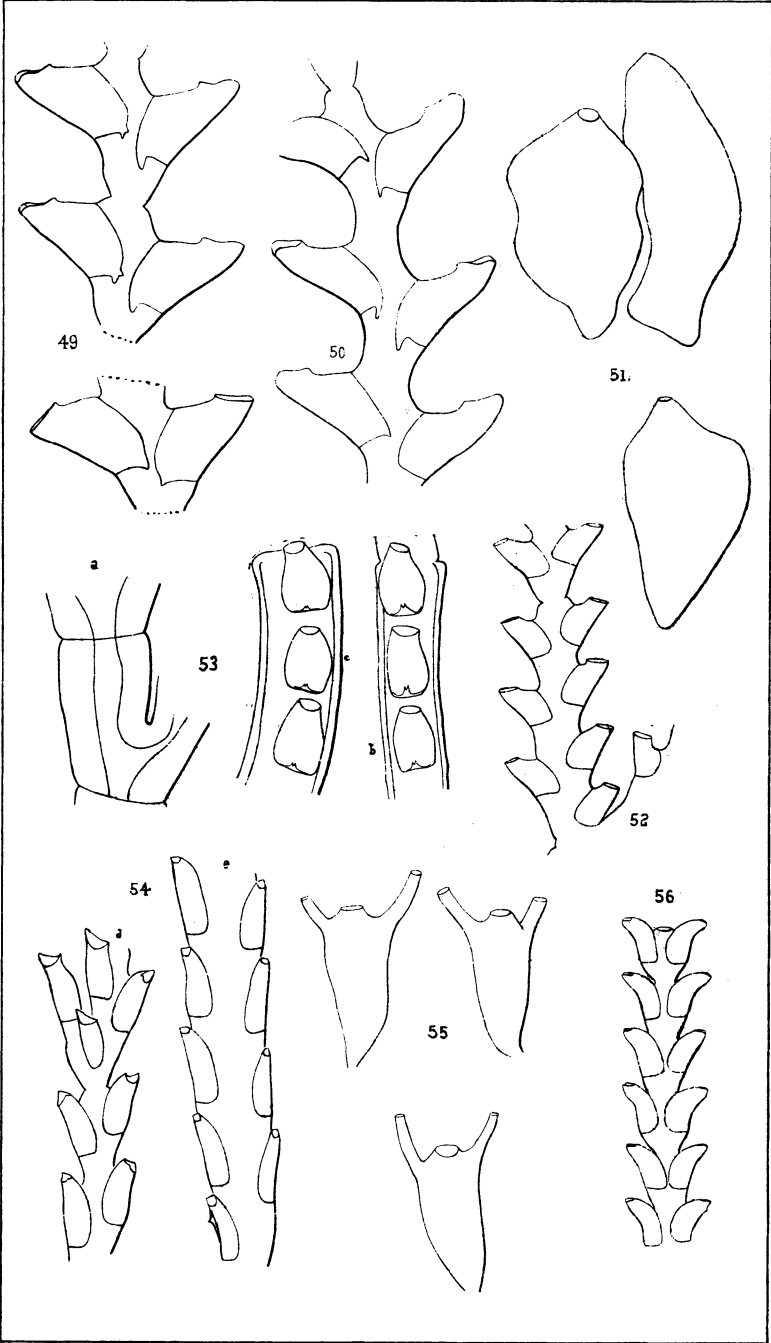
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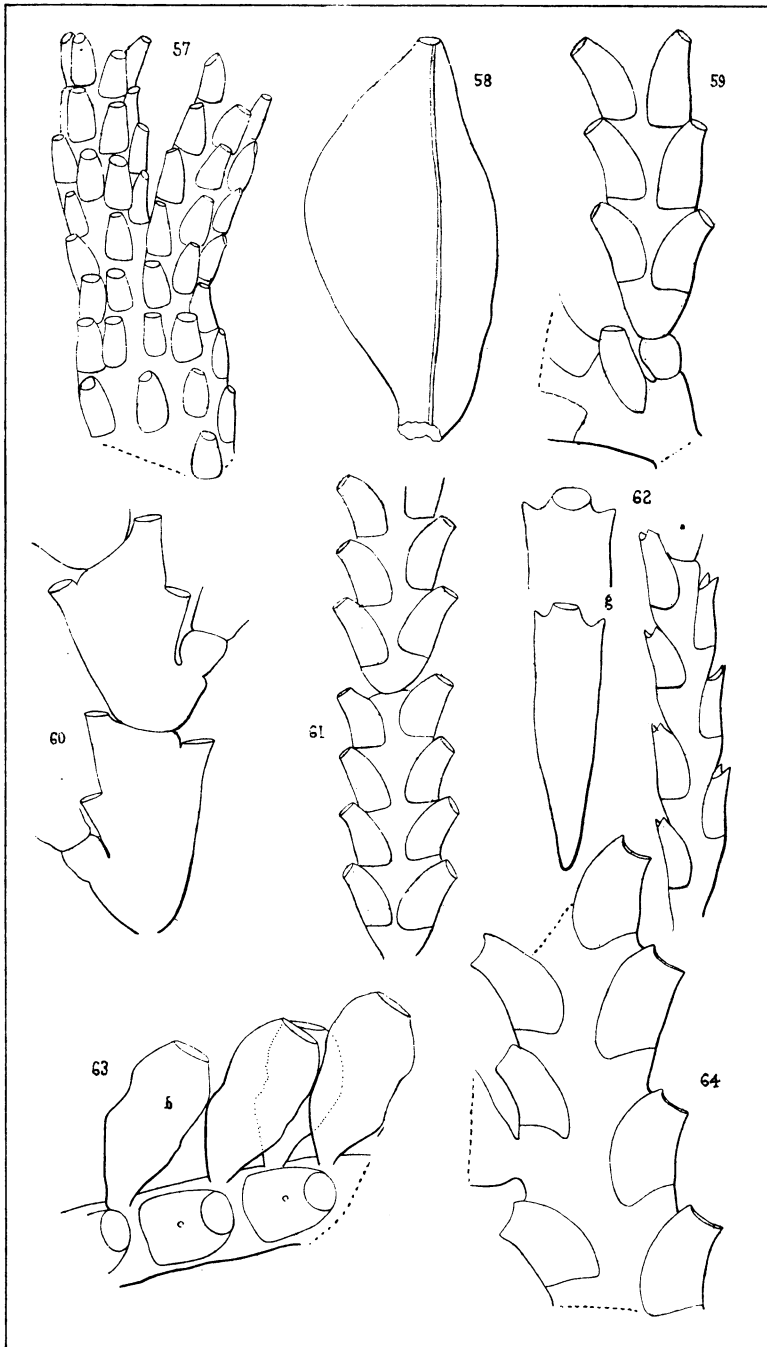


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